

DEEP-SEA ISOSPONDYLOUS FISHES¹
TWO NEW GENERA AND FOUR NEW SPECIES

BY WILLIAM BEEBE

(Figs. 39 to 42 incl.)

This is the second installment of descriptions of new forms of deep-sea fish taken on the Bermuda Oceanographic Expeditions of the Department of Tropical Research of the New York Zoological Society. They were all taken within the eight-mile circle whose center is at 32° 12' North Latitude and 64° 36' West Longitude, nine and one quarter miles south-southeast of Nonsuch Island, Bermuda.

The descriptions are published here in advance of the final ecological studies of the families to which these new forms belong. The monographs will appear very shortly.

Figures 39, 40, 41 and 42A are by Helen Tee-Van; figure 42B by Edward Delano.

LIST OF SPECIES

Family ALEPOCEPHALIDAE

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Family STOMIATIDAE

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Anomalopterus megalops sp. nov.

Type: Department of Tropical Research No. 11,456; Bermuda Oceanographic Expedition of the New York Zoological Society; Net 280; July 10, 1929; 12 miles south of Nonsuch Island, Bermuda; 700 fathoms; Standard length 31 mm.

Measurements and Counts: Standard length 31 mm; depth 7.8 (in length 4); head 15.3 (in length 2); maximum thickness 6.5 (in length 4.8); eye diameter, without fold, 3.3 (in head 4.6); eye fold .48; snout 3.8 (in head 4); maxillary 8.2 (in head 1.9); interor-

¹ Contribution, New York Zoological Society, Department of Tropical Research, No. 415.

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bital 2.4 (in head 6.4); branchiostegal rays 7, partially united beneath the isthmus; pectoral rays 7; pectoral length 1.9; pelvic rays 7; pelvic length 2.5; dorsal rays 21; anal rays 20.

General Description: Due to the enormous size of the head, the

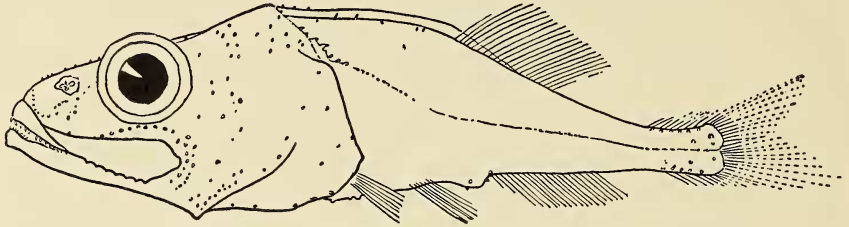


Fig. 39. *Anomalopterus megalops* sp. nov.

deepest part of the body falls far back, at about the middle of the length. From here it slopes forward gradually to a deep, blunt snout, and more rapidly posteriorly, ending in an elongated, slender peduncle.

The large eyes are high on the head, interrupting the dorsal profile, and the eye-ball is surrounded by a thick, fleshy fold, making these organs look even larger than they are. The nostrils are conspicuous, slightly nearer the anterior margin of the eye than the tip of the snout, and are above a line drawn between these two places. The narial area is very large, measuring a millimetre in diameter. The mouth is of great size, with a slight downward slope posteriorly, the maxillary ending just short of the posterior vertical of the eye.

The teeth are small, slightly curved, and present on the premaxillary, maxillary and the anterior part of the mandible. The maxillary teeth are seven in number and alternate with shallow, rounded scallops. The vomer and palatines are edentulous.

The gill openings are large; the opercula are covered with skin and the posterior margin is smooth.

The skin is scaleless and smooth except for numerous small tubercles, abundant on the head, and less so on the body, where they are scattered along the dorsal fold and the lateral line, around the anus and at the base of the caudal fin. A low dermal ridge begins at the nape and extends halfway down the back, encroaching considerably upon the anterior portion of the dorsal fin. The latter occupies about the middle third of the back. The anal originates at the

vertical from the middle of the dorsal, and extends about half its length behind the dorsal. The pectorals are inserted close to the ventral profile and are very short. The pelvics, of equal length, originate well in advance of the dorsal fin.

Discussion: My specimen, No. 11,456, must be referred to the genus *Anomalopterus* on the basis of the two dominant generic characters—the enormous size of the head and the presence of the adipose fold preceding the dorsal fin, unless a new genus be made due to the presence both of maxillary teeth and of dermal tubercles in the present specimen.

The only other species, and in fact individual of the genus, *Anomalopterus pinguis*, was described by Vaillant,² from off northern Africa, at a depth of 1400 metres or 765 fathoms.

Anomalopterus megalops differs from Vaillant's species in the much larger eye (4.6 in head, not 20), the presence of teeth on the maxillary, the conspicuous nostrils, increased vertical finray counts and the presence of tubercles on the skin.

Even allowance for a difference in age (*pinguis* is twice as long as *megalops*) could not account for the greatly disproportionate size of the eye, the inconspicuousness of the nostrils and the total absence of dermal tubercles.

The type is in the collection of the Department of Tropical Research of the New York Zoological Society.

Macromastax gen. nov.

Generic Characters: Elongate, moderately compressed Aleppoccephalids, with naked, delicate skin, no sign of tubercles, and no nuchal dermal fold; lateral line distinct; the head large (less than 3 in length); mouth very large, with the maxillary reaching far behind the posterior margin of the orbit; the jaws nearly equal; snout short; teeth uniserial, absent from the vomer, but present on the premaxillary, maxillary, mandible and palatine; eye large; the gill membranes not joined beneath the isthmus; 9 branchiostegals; the paired fins are close to the ventral profile; the pectorals small and feeble; the pelvics well developed, just within the posterior half of the fish; the dorsal is about twice as long as the anal, originating far in advance of it, at the vertical of the pelvic base; caudal well developed, forked.

² 1888—Poissons, Exp. Scient. Talisman et Travailleur, pp. 160-162; Pl. XI, fig. 4, 4a.

Comparison with Other Genera: This genus is immediately distinguishable from other scaleless Alepocephalids by the following characters:

From *Xenodermichthys* and *Rouleina* by the inequality of the vertical fins, the forward position of the dorsal, and the great size of the maxillary.

From *Leptoderma* by the shortness of the vertical fins, the fact that the dorsal is longer than the anal instead of vice versa, and by the great size of the maxillary.

From *Anomalopterus* and *Photostylus* (see pgs. 60 and 64) by the absence of an adipose fold in front of the dorsal fin.

In addition to its lack of scales, *Macromastax* differs most obviously from the remaining Alepocephalids which have short snouts, pelvic fins and maxillary teeth as follows:

From *Bathytroctes* (including *Talismania*) in the great length of the maxillary, in the presence of 9 instead of 7 branchiostegals, and in the absence of vomerine teeth.

From *Bajacalifornia* in the lack of a pointed, symphysial knob, and in the large size of the maxillary.

From *Narctes* in having uniserial instead of polyserial teeth, and more than seven branchiostegals.

***Macromastax gymnos* sp. nov.**

Type: Department of Tropical Research No. 10,829; Bermuda Oceanographic Expedition of the New York Zoological Society; Net 210; June 22, 1929; eight miles south of Nonsuch Island, Bermuda; 1000 fathoms; Standard length 35 mm.

Measurements and Counts: (These measurements were made from the fresh specimen). Total length 42.2 mm; standard length 35 mm; depth 6.5 (in length 5.4); head 12.8 (in length 2.7); eye 3.5 (in head 3.7); snout 2.1 (in head 6.1); maxillary 8.5 (in head 1.5); pectoral ca. 10; pectoral length 2.2; pelvic 7; pelvic length 6.3; dorsal 25; anal 12; 9 branchiostegals.

General Description: Body deepest immediately behind the large head; dorsal and ventral profiles almost horizontal, the slope being very slight to the short, thick peduncle. Top of head straight, dipping abruptly at front of eye to the short, blunt snout. Eye very large, almost filling the space between the top of the head and the maxillary line; pupil elliptical. Nostrils conspicuous, half-way be-

tween eye and snout. Maxillary straight, slanting obliquely downward and back, extending almost the diameter of the eye behind the posterior margin of the orbit.

There are 5 short, recurved teeth on each premaxillary ramus,

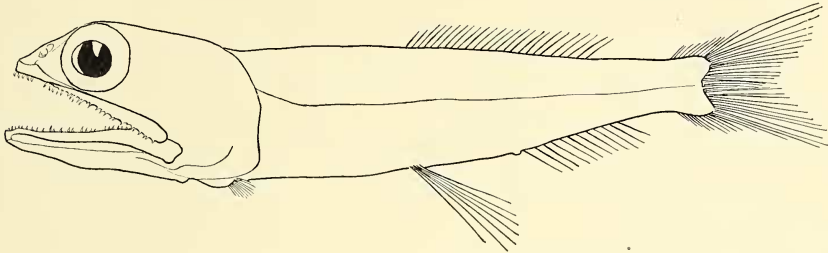


Fig. 40. *Macromastax gymnos* gen. et sp. nov.

and 24 along the maxillary, separated and rather irregular; on the posterior third these tend to be arranged in pairs; on the mandible are 44 teeth, equally small and curved; some of these are not in perfect alignment, but there is no evidence of biseriality; each palatine has 6 teeth, but there are none on the vomer.

Type in the collections of the Department of Tropical Research of the New York Zoological Society.

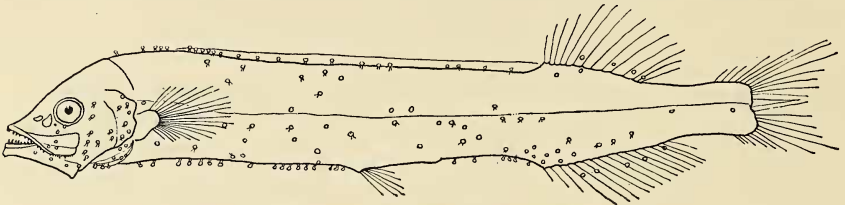
Photostylus gen. nov.

This genus differs from all the Alepocephalidae except *Anomalopterus* in having a prominent pre-dorsal fold or adipose fin along the back. It differs from that and other closely related genera (such as *Rouleina* and *Xenodermichthys*) in its steeply ascending, concave snout, small head and relatively high and well developed pectoral fins. The skin is without scales; the jaws are equal, with a prominent symphyseal knob; the mouth moderately large; teeth present on the premaxillary, maxillary, mandible and palatine; 6 branchiostegals; pectorals large and placed high; pelvics small, inserted at about the middle of the body; vertical fins almost equal, far back.

Photostylus pycnopterus sp. nov.

Type: Department of Tropical Research No. 10,217; Bermuda Oceanographic Expedition of the New York Zoological Society; Net 137; May 30, 1929; 9 miles south-east of Nonsuch, Bermuda; 800 fathoms; Standard length 64 mm.

Measurements and Counts: (From fresh specimen, now shrunk-en slightly as to length and eye). Total length 71 mm; standard length 64 mm; depth 9.2 (in length 6.9); head 11 (in length 5.9);



[Fig. 41. *Photostylus pycnopterus* gen. et sp. nov.

eye 2.5 (in head 4.4); interorbital 2.5 (in head 4.4); snout 4 (in head 2.7); maxillary 5.8 (in head 1.9); branchiostegals 6; pectoral rays 18; longest pectoral ray 4.3; pelvic rays 6; pelvic length 4; dorsal $13\frac{1}{2}$; anal $17\frac{1}{2}$; caudal rays ca. 35; caudal tip broken.

General Description: Considerably elongate and compressed; body profiles almost horizontal, sloping very slightly backward to the tail; the nape is somewhat elevated, and the head depressed, the top of the head curving evenly down to the eye, from whence to the tip of the snout the profile is concave; the ventral profile of the mandible extends obliquely downward, with a prominent posterior angle, well below the profile of the head; the vertical fins arise from elevated, fleshy bases, considerably increasing the depth of the posterior body profile.

Head and eye both small; nostrils large, nearer eye than tip of snout; jaws equal in front, the symphysis of the mandible prolonged downward into a prominent knob; maxillary flat and greatly widened posteriorly, extending to the vertical of the posterior border of the eye.

Small teeth in uniserial rows are present on the premaxillary (27), maxillary (17), mandible (24), and palatine (2); the vomer is toothless; the teeth are close-set, but besides the symphyisial gaps, there are other, occasional, narrow, asymmetrical gaps and a few replacement teeth.

The head and body are covered with an irregular scattering of photophores, elevated on stalks: these consist of a terminal, pigmented body, with a white or iridescent summit, the whole elevated on a thick, colorless stalk.

From the inter-mandibular membrane arise four pairs of singular looking organs, leaf-like but rather thick and dead white. Together with several small, adjacent patches, these seem to form an illuminating organ, comparable with nothing with which I am familiar in any other Alepocephalid.

On the nape, just back of the vertical of the fleshy base of the pectorals, there rises a thick, fleshy, median fold or adipose fin. This increases slightly in height and extends back to the dorsal, where it merges with the raised, fleshy base of that fin.

The type is in the collections of the Department of Tropical Research of the New York Zoological Society.

***Macrostomias calosoma* sp. nov.**

Type: Department of Tropical Research No. 18,781; Bermuda Oceanographic Expeditions of the New York Zoological Society; Net 890; September 15, 1930; 12 miles south-east of Nonsuch Island, Bermuda; 600 fathoms; standard length 430 mm.

Measurements and Counts: (Made from the fresh specimen). Total length 450 mm; standard length 430 mm; depth 21 (in length 20.5); head 27 (in length 15.9); eye 6 (in head 4.5); snout 6 (in head 4.5); maxillary 28; mandible 33; interorbital 6 (in head 4.5); pectoral rays 6; pectoral length, longest ray 20, shortest rays 1.1; pelvic rays 5; pelvic length 60; dorsal rays 14; anal rays 15; snout to pectoral 30; snout to pelvic 236 (in length 1.8); scales, in a longitudinal series, 164; barbel 300 (in length 1.4, divided by head 11). Photophore counts: Hyoid 22; lateral series, P-V 79, V-A 59; ventral series, I-P 12, P-V 80, V-A 60, A-C 20.

General Description: Exceedingly long and slender, the head scarcely deeper than the body and typically *Stomias*-like in form.

Teeth: All slender and curved; premaxillary 6, the second a long, curved fang, first and third very small, others slightly larger; maxillary 11; mandible 10 in each half, the second long, curved, somewhat shorter than the corresponding tooth in the upper jaw, others small, sixth to tenth very small, in posterior part of jaw, in two sets of two and three; vomer 1 pair; palatines 3 pairs.

There is a round cheek light obliquely below and back of the eye. The barbel is longer and more complicated than that of *M. longibarbatius*, the other species of the genus, and takes rank with the most specialized organs of the family. It arises far forward in

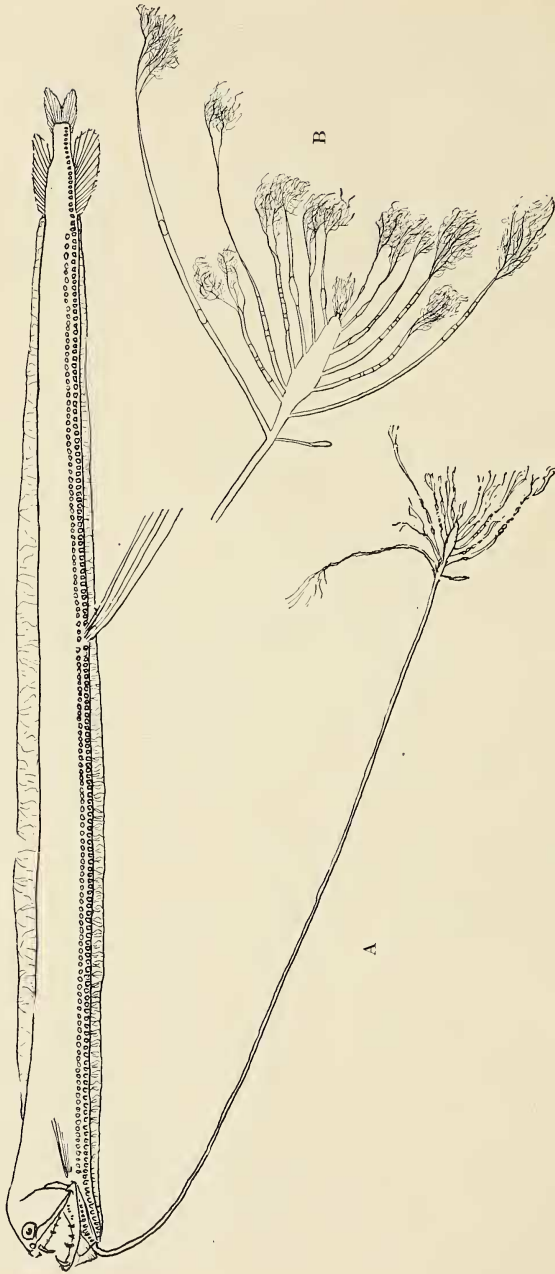


Fig. 42. *Macrostromias calosoma* sp. nov. A. Lateral view; B. End of bar bel.

the intermandibular tissue in front of the photophores, swung from a stout mass of translucent muscle. The very long stem is transparent, showing a thin, central core, and is dotted, sparsely and irregularly, with small, black chromatophores. It narrows very gradually and near the end is only about half the basal diameter. The tip consists of a long, narrow spindle of pale yellow, luminous tissue. Just above this arise two branches, the superior one short and of irregular shape, the inferior with a long stem ending in a burst of luminous yellow beads. From the origin of this pair to the tip of the bulb are about a dozen lateral branches, no two alike, some with a stem of luminous beads, others with only a terminal brush of filaments. At the extreme tip of the bulb arise several, slender, thread-like filaments. The whole forms a luminous organ of considerable power, which when glowing must look like a tassel of filmy, luminous threads.

Many clusters of small photophores are scattered on the head and around the bases of the fins, while each scale contains a light in its lower central portion. All of these, as well as the serial photophores, are directed straight downward, except the hyoid lights which point obliquely downward and back, and the subocular which is directed slightly up and back.

The pectoral fin is rather short, well formed, but of a specialized, translucent, white tissue, very evidently luminous. The rays of the pelvics are extremely long and slender, not tipped with luminous bodies as in *M. longibarbatu*s. They are placed slightly behind mid-body.

Comparison: The genus *Macrostomias* is known from one other species, *M. longibarbatu*s Brauer, recorded from the eastern Atlantic and Indian Oceans. *M. calosoma* differs from *M. longibarbatu*s in its longer and more elaborate barbel (head contained in barbel's length 11 not 7 times); its greater depth (20.5 not 33 in length); fewer V-A photophores (59 instead of 67 to 68 in the lateral series); more numerous teeth; slightly larger eye; slightly longer snout; and in having a round, not elongate, suborbital organ.

Type in the collections of the Department of Tropical Research of the New York Zoological Society.